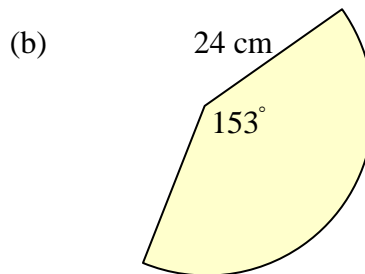
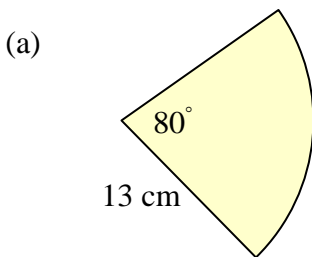


**National 5**

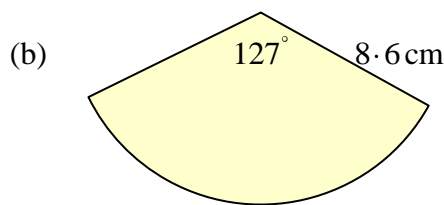
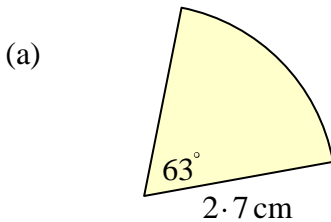
**Homework EF15**

1. A is the point  $(3,4)$  and B is the point  $(5,10)$ . Find the gradient of AB. A rough sketch will help.
2. Repeat question 1 for the following pairs of points.
  - (a) C  $(2,3)$  and D  $(7,18)$ .
  - (b) E  $(0,3)$  and F  $(7,-17)$ .
  - (c) G  $(-1,3)$  and H  $(4,0)$ .

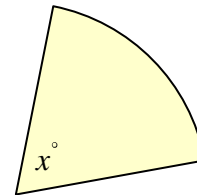
3. Find the length of the curved arc in each of these sectors.



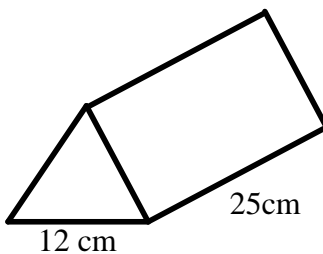
4. Calculate the area of each of these sectors.



5. Calculate the size of angle  $x^\circ$  in the sector opposite. The sector has area 20 square cm and radius 5.8 cm.



6. Calculate the volume of the prism sketched below. The cross-section is an equilateral triangle of sides 12 cm.



7. (a) A cylinder has radius 5 cm and height 8 cm. Calculate its volume.  
 (b) A second cylinder has radius 3 cm and the same volume as the first cylinder. Calculate the height of the second cylinder.
8. (a) A sphere has radius 4 cm. Calculate its volume.  
 (b) A cone has height 10 cm and the same volume as the sphere. Calculate the radius of the cone.

9. Factorise.

- |                    |                     |                    |
|--------------------|---------------------|--------------------|
| (a) $x^2 + x - 20$ | (b) $k^2 - 25$      | (c) $4x^2 - 9y^2$  |
| (d) $1 - 16y^2$    | (e) $x^2 - 8x + 16$ | (f) $2x^2 - x - 6$ |

10. By first factorising numerator and denominator, simplify each of these fractions:

- |                          |                                 |                            |
|--------------------------|---------------------------------|----------------------------|
| (a) $\frac{3x+6}{x^2-4}$ | (b) $\frac{a^2-a-6}{2a^2-5a-3}$ | (c) $\frac{x+7}{x^2+6x-7}$ |
|--------------------------|---------------------------------|----------------------------|

11. Simplify these surds

- |                  |                 |                  |
|------------------|-----------------|------------------|
| (a) $\sqrt{12}$  | (b) $\sqrt{18}$ | (c) $\sqrt{128}$ |
| (d) $\sqrt{108}$ | (e) $\sqrt{75}$ | (f) $\sqrt{320}$ |

12. Rationalise the denominator

- |                          |                           |                           |
|--------------------------|---------------------------|---------------------------|
| (a) $\frac{3}{\sqrt{3}}$ | (b) $\frac{15}{\sqrt{5}}$ | (c) $\frac{27}{\sqrt{3}}$ |
|--------------------------|---------------------------|---------------------------|

13. (a) Express  $x^2 - 6x + 13$  in the form  $x - a^2 + b$   
 (b) Express  $x^2 + 2x + 11$  in the form  $x + a^2 + b$   
 (c) Express  $x^2 - 8x + 10$  in the form  $x - a^2 + b$   
 (d) Express  $x^2 + x + 1$  in the form  $x + a^2 + b$

14. Multiply out and simplify:

- |                          |                              |
|--------------------------|------------------------------|
| (a) $4x - 1^2$           | (b) $(3x+1)(x-3) - 2x(2x-1)$ |
| (c) $2x - 3^2 - x + 2^2$ | (d) $(x-2)(x^2 - 2x + 3)$    |